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ABSTRACT

Current energy shortages have created the need for educational programs to prepare tomorrow's consumers and workers for occupations that are more responsive to the realities of the energy situation. Particularly needed is an energy program stressing productive conservation. (Productive conservation emphasizes using less energy to perform the same amount of work and is distinguished from the approach that views conservation as curtailment.) Because of the shortage of current and appropriate instructional materials, a new energy awareness and conservation project entitled "Energy Awareness and Conservation: You Make the Differences," was undertaken to design an energy education curriculum that would mesh with ongoing educational activities and that would be compatible with existing courses and vocational training programs. The materials developed included two introductory motivational modules, an activity package for classroom use, and reference guides describing exemplary conservation activities. In addition, a series of guidelines were formulated for use by those involved in curriculum development efforts. Included among these guidelines were suggestions for assessing the need for materials, targeting materials, designing materials to complement ongoing instructional activities, providing for future modification, and formulating dissemination plans. (MN)

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DESIGNING AN ENERGY EDUCATION CURRICULUM IN PRODUCTIVE CONSERVATION FOR VOCATIONAL EDUCATION STUDENTS

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DESIGNING AN ENERGY EDUCATION CURRICULUM IN

PRODUCTIVE CONSERVATION FOR VOCATIONAL EDUCATION STUDENTS

Over the past 10 years the public has been exposed to countless advertisements, slogans, and even presidential proclamations designed to stir the sluggish spirit of energy conservation. "Don't Be Fuelish," "Project Independence," and "The Moral Equivalent of War" are only a few of these slogans. However, one clear fact stands out better than any slogan: Saving energy is the same as saving money. This fact is probably the most effective incentive to practice energy conservation.

Few would disagree that when energy prices rise, conservation becomes more desirable. With energy shortages threatening the economic and political stability of countries throughout the world, energy conservation has become an essential national goal. The question facing us is: how do we effectively inform and educate the public in ways to conserve energy? The specific challenge to vocational education is to prepare tomorrow's consumers and workers for occupations and lifestyles that are more responsive to the realities of the energy situation.

In large part, the resolution of the energy problem rests in teaching consumers to manage and use available resources more efficiently and productively. New skills will have to be taught and a new energy consciousness nurtured in students by:

1. increasing students' awareness and understanding of the energy situation;
2. including facts about energy consumption in consumer education and vocational training programs;

3. providing direct instruction in efficient energy use and management strategies; and

4. demonstrating the relationship of energy use to personal actions--showing that the actions of an individual do indeed make a difference.

Over the years, consumers have invested in energy conservation simply to counteract the ever higher prices for gas, oil, and electricity. Will high energy prices continue to provide a sufficient incentive for consumers to continue their conservation measures, or will people become accustomed to the price increases and again escalate their consumption of energy? Would the public be more effective energy conservers if they appreciated the seriousness of the energy situation and understood the basic facts and concepts behind it?

Opinion polls have shown that the American public questions whether an energy crisis really exists. From 1973 through 1981 some government officials, business leaders, and university professors have publicly labeled the energy "crisis" as a hoax. Yet, equally prominent figures have denied that this is so. This inconsistency has caused considerable confusion, reflected in the results of a 1978 study by the National Assessment of Educational Progress (NAEP).

The NAEP study found that while most of the young adults surveyed said they felt the energy problems confronting the nation were serious, they had limited knowledge of the basic energy facts and concepts needed to understand the energy situation and to make realistic decisions. For example, less than one-fourth of the respondents knew that heating water consumes more energy in an average American home than refrigerating,

cooking, clothes drying, or lighting. The results also suggested that young adults are naively optimistic about the potential solutions to energy problems, and have a deep-rooted and unrealistic belief in the healing powers of technology. However, many of these adults seemed to realize that they needed more information, and 34 percent agreed that they would do more about conserving energy if they knew more about energy-saving methods.

Too often conservation is negatively viewed as curtailment, overhaul, or belt tightening. This is, in some ways, a realistic view, since tight restrictions on energy use can occur when energy supplies are suddenly interrupted. Energy saving is then forced upon the public as factories are closed, working days are lost, and gasoline lines form and people cut down on driving because the supply of gasoline is limited. This is indeed what happened when there was a shortage of natural gas in 1976 and 1977, during the coal strike of 1977 and 1978, and during the gas and oil crises of 1974 and 1977.

However, there is another way to think of energy conservation: as a positive set of attitudes and behaviors that result in constructive actions such as insulating buildings, increasing the efficiency of cars, appliances, and industrial processes, capturing and reusing waste heat, and changing behavior to promote energy savings in ways that are economically and socially nondisruptive. This is called productive conservation.

The purpose of productive conservation is to use less energy to perform the same amount of work. It emphasizes no- and low-cost energy conservation methods. Productive conservation demands changes in attitudes toward energy use as well as changes in behavior. It promotes the

communication and implementation of energy conservation strategies that can be taught and modeled.

Education must play a major role in the public's acceptance of energy conservation. Because vocational education reaches the future workers and consumers of this country, it is a logical avenue for exploring solutions to the energy problem. The experiences and ideas students develop in training will be translated into action both in their homes and at their places of work. These actions will then cause a ripple effect, disseminating information and developing new approaches to productive energy conservation.

The Need for Instructional Materials

Vocational education can provide adults and youth, our present and future consumers and workers, with both the personal and professional energy conservation information they need. However, to teach students to be more effective and productive in their use of energy, vocational programs need instructional materials that are appropriate for vocational education students and tailored to vocational education training programs. The difficulty lies in identifying and organizing instructional materials on energy conservation that are comprehensive, concise, current, and appropriate for use in vocational education programs. A new energy conservation project, entitled "Energy Awareness and Conservation: YOU Make the Difference"* was designed to meet this need.

The first step in designing the Energy Awareness and Conservation curriculum involved identifying, collecting, reviewing, and evaluating

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*Contracted by the U.S. Department of Education, Office of Adult and Vocational Education.

available energy education, energy management, and energy conservation materials with regard to their comprehensiveness and instructional appropriateness for use with vocational education students. Based on the results of this survey, the occupational areas for which conservation instruction materials were lacking, insufficient, or inappropriate were identified.

Various industries have taken active roles in producing and distributing materials relating to energy to schools and industrial training programs. For example, Gulf, Chevron, Phillips, and Exxon all offer energy-related educational aids as part of their public relations programs, developed in response to teachers' requests for current information. However, these materials are rarely in a form appropriate for use by students. Typically, they comprise isolated units of information that seldom constitute a consistent or intact curriculum that is related to ongoing instructional activities. In addition, some of these materials have been criticized as one-sided and self-serving.

There are also numerous "energy awareness" materials available that document historical, sociological, environmental, or scientific perspectives on the current energy situation. These are available in a variety of forms, such as literary analyses, fact sheets, informational manuals, and research reports on energy conservation programs and energy issues of production, supply, and demand. However, much of this material is highly technical and is not appropriate for instructional purposes or amenable to adaptation for classroom use.

Effective curricula do exist. However, the use, availability, or adaptability of these materials for vocational education programs has

been limited by the following factors:

1. the materials were developed for a specific locale or context;
2. the materials were not disseminated effectively; and
3. the content is highly specific and time-dated due to technological changes or changes in the demand or availability of existing energy resources.

There is a need for timely and unbiased instructional materials in energy conservation. But if the materials are to have direct potential for affecting energy behavior, they must be:

1. relevant to the experiences, training, and instruction received by the students;
2. in a format that can be used by teachers and that can be easily integrated into existing programs; and
3. reflective of student enrollment and projected occupational demands.

Instructional Design Strategy

An underlying assumption of the instructional series developed in the Energy Awareness and Conservation project is that students need to understand that they can make a personal contribution to the national effort to conserve energy productively. A primary consideration of the instructional design strategy was the designation of a format that would mesh the instructional materials with ongoing educational activities, and that would be compatible with existing courses and vocational training programs. The outcome: a series of instructional materials that includes

- o two introductory motivational modules,
- o twenty-two occupation-specific energy conservation instructional modules,
- o an activity package for use by individuals or groups of students within a classroom situation, and
- o reference guides describing exemplary conservation activities, for use by student groups and vocational organizations outside the classroom setting.

These materials were designed to be flexible and adaptable to a variety of instructional contexts and modes (e.g., individualized or group instruction). No prescribed instructional sequence is stated for using these materials. The materials are intended to: introduce students to the facts regarding efficient energy use, productive energy conservation, and energy waste; present information to help students understand what personal contributions they can make to solving the energy problem; and provide instruction in non-technical energy conservation practices that are specific to the vocational discipline and the particular occupation in which the student is being trained.

Guidelines for the Developers

The instructional strategy undertaken in the Energy Awareness and Conservation project has implications for the scope and content of future curriculum development efforts.

1. When selecting the vocational courses for which to develop instructional materials, assess both current and anticipated student course enrollment, the potential role of the vocational student in-training as an advocate of energy conservation,

and the potential impact of energy-saving behaviors both on the job and at home.

2. Because the ultimate responsibility for effective use of materials rests with the instructors, design flexible materials that can accommodate not only the individual teaching style of the instructors, but also the instructional context (group instruction, independent reading assignments, lectures, and so on).

3. Target your materials to grade, subject matter areas, and the identified ability level of the students. These factors will in turn determine the complexity and learning objectives of the materials. Materials too difficult or too easy to master will only confound the learning process.

4. Design your materials to mesh with or complement ongoing instructional activities. While some materials may be well packaged and technically impressive, students will find them irrelevant if they do not support the learning tasks at hand.

5. Design your materials so that they can be used effectively with available resources. If materials require extensive review and preparation time by the instructor, their instructional value will be limted.

6. Design your materials so that they can be used with regularly scheduled class instruction. Generally, classroom instruction is based upon predetermined programs and schedules. If your materials require an extensive amount of time to be used and cannot accommodate the constraints of the regular programs

and schedules, the materials will not be effectively employed in the classroom.

7. Make provisions for future modifications and revisions to maintain the accuracy of the materials and to prolong their usable life span.

8. Design broad-based dissemination plans to inform people of the availability of the materials--what they look like, the intended audience, and how much they cost. Instructional materials that are appropriate for use with vocational education students may also be in high demand by various groups such as trade unions, public utility companies, CETA, and training programs within various industries. In addition, school districts may want to adapt them for use in social studies, science, and other non-vocational courses.

These guidelines for developing instructional materials in energy conservation are presented to assist vocational educators in responding to the needs of students by providing instructional opportunities for training workers in productive conservation practices and skills; for integrating energy concepts, techniques, and skills into existing programs; and for helping students develop an awareness of their personal contributions in responding to the energy problem. The Energy Awareness and Conservation instructional materials represent an integrated effort between an identified educational need and the functional skills demanded by changing society and changing economic and workforce needs.